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O. H. M. S.

W. J. Gerald Doputy Minister.

### LABORATORY

OF THE

### INLAND REVENUE DEPARTMENT

OTTAWA, CANADA

BULLETIN No. 176

MUSTARD

### LABORATORY

OF THE

### INLAND REVENUE DEPARTMENT

OTTAWA, CANADA.

BULLETIN No. 176.

### MUSTARD

OTTAWA, March 1, 1909.

WM. HIMSWORTH, Esq.,

Acting Deputy Minister of Inland Revenue.

Sir,—I beg to report upon 76 samples of Mustard, collected throughout the Dominion in January of this year.

Mustard has been made the subject of examination in this laboratory on two former occasions, viz.;—in 1890 (95 samples, see Bulletin 19), and in 1897 (66 samples, see Bull. 50).

In Bulletin No. 19, the late Chief Analyst directs attention to the need of definite standards for mustard; and suggests the adoption of a minimum limit of 30 per cent. fixed oil for genuine mustard, and of 22 per cent. for compound mustard.

The importance of legalizing a definition of mustard is undeniable, and until this is done, I find it quite impossible to declare adulteration in any of the extremely variable samples, sold under this name.

That such definition should depend mainly upon a percentage of fixed oil in the article, is not so clear. The fixed oil of mustard is present in mustard seeds (both black and white) to the extent of about 25 per cent.: and the sifted farina of mustard contains this oil to about 35 per cent. or slightly higher. (Piesse and Stansell; The Analyst, 1880, p. 161).

But the value of mustard as a condiment does not depend upon the content of fixed oil. White mustard, which per se, has little condimental value, contains as much fixed oil as black mustard. Nor did the late Chief Analyst suggest the determination of fixed oil in mustard as being itself directly an element of value in the condiment, but rather as a means of ascertaining the amount of foreign material present in admixtures. This added material is usually starch or turmeric, and is practically fat free.

Since the fixed oil in mustard seed is fairly constant, the suggestion to make the percentage of fixed oil in mustard flour a basis for calculating the amount of foreign matter added is a reasonable one, provided that mustard seed is always ground in its natural state, i.e., without removal of any portion of the fixed oil. This, however, is not the case. The oil greatly interferes with the pulverizing of the seed, and over 75 per

cent. of it may be removed by pressure before grinding, so that estimation of the fixed oil in the finished product, affords no trustworthy basis for calculation as to foreign matter added. The fixed oil of mustard is a bland oil, applicable to various dietetic purposes, but quite devoid of such condimental properties as are valued in mustard.

The characteristic pungency of mustard is due to a volatile oil, only traces of which exist in the dry mustard, but which is developed, by the action of a ferment (myrosin) upon potassium myronate, in the presence of water. It is only upon mixing mustard with water that the pungent flavour is developed. Potassium myronate is present to the extent of about 1.5 per cent. in black mustard seed, and is practically absent from white mustard. This latter contains only traces of volatile oil as such, while about half of one per cent is present in the black seed. It follows, from what has been said, that the better way of valuing mustard, would be by direct estimation of its volatile oil, after

a treatment converting potassium myronete into this last.

It is found in practice, that although the white mustard seed contains no potassium myronate, its presence in admixture with the black seed assists in the generation of volatile oil from the latter; and for this reason the two varieties are good together. This is due to the fact that a ferment (myrosin) whose presence determines the conversion of potassium myronate into volatile oil of mustard, is more largely present in white than in black mustard, although the glucoside (sinigrin) upon which it sets, to develop the volatile oil is practically absent from white mustard. A glucoside (Sinalbin) exists in white mustard, which, when acted upon by water in presence of myrosin, yields an oil (Sinalbin mustard oil) which has the pungent, burning taste, and vesicating properties of the volatile oil of black mustard; but this oil is only slightly volatilized with steam, and its presence does not materially interfere with the estimation of volatile mustard oil. (Allylisothiocyanate).

From the work of Piesse and Stansell already quoted, F. Sutton (Allen's Commercial Organic Analysis; vol. III, part 3, p. 116); Schlicht (Zeits. Anal. Chem. XXX. 661), and others, I am of opinion that the determination of volatile oil of mustard is practicable as a means of assaying commercial mustard; and I hope to investigate this

matter more fully at an early date.

The following definition of mustard has been adopted by the United States Depart-

ment of Agriculture (Circular No. 13, Dec. 20, 1904, p. 11):-

"Ground Mustard is a powder made from mustard seed, with or without the removal of the hulls and a portion of the fixed oil, and contains not more than two and five tenths (2.5) per cent. of starch and not more than eight (8) per cent. of total ash."

This definition leaves much to be desired, as it makes no reference to the component (volatile oil) upon which the real value of ground mustard depends, whether considered

as a condiment, or as a vesicant.

It will be seen on looking through the tables in this report, that very few samples of mustard found on the Canadian Market are free from starch and turmeric. Nor is it to be understood that the addition of starch and turmeric is made for purposes of fraud. Certain brands of this condiment, which have been on the world's markets for generations, and have received recognition and honours at International Exhibitions, are avowedly mixtures of mustard farina with other materials. The public have approved of these compounds; and other manufacturers have, on this account, been led to imitate It may be, as alleged by some makers, that the presence of starchy matters is necessary, to give better keeping quality to the article, which without starch, tends to become lumpy and sticky; that turmeric is desirable to give a pleasing colour to mustard, especially when mixed with water for the table; that the removal of a large percentage of the fixed oil is necessary to permit of satisfactory grinding and sifting. On the other hand, it is claimed the the seeds of white mustard although not possessed of the pungent properties essential to mustard as a condiment, contain the finer and distinctive flavours of mustard, and are as necessary to the production of a desirable condiment as the black mustard. And further that even the same variety of seeds exhibits so great differences in crops of different years that it is impossible to make satisfactory blends except under the guidance of an expert, v.ho is guided rather by the cultivated senses of taste, and smell, than by varietal differences in the seeds themselves. However this may be, it is certain that mustard should be sold for what it is; and that the presence of added matters should be announced on the label.

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The question of the amount of added matters which may be permitted is serious, from the point of view of the use of mustard as a domestic remedy, in blisters, poultices, emetics, &c. The mustard of the pharmacopæias permits of no admixture. Mustard as a condiment is another matter, and the public should learn to recognize the distinction between the two. Condimental austard may be regarded as a substitute, in emergency, for the pharmacopæal mustard, but by no means to be confused with this last,

But even as a condiment, there is a degree of dilution which amounts to fraud. The fixing of limits defining mustard for condimental purposes is under consideration. The problem is not a simple one, ar 3 T am not yet in a position to submit a formal solution. I would respectfully reco. d the publication of this report as Bulletin

No. 176.

I have the honour to be, Sir,

Your ob lient servant,

A. McGILL, Chief Analyst.

### BULLETIN No. 176-MUSTARD.

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# DISTRICT OF NEW BRUNSWICK-J. C. FERGUSON, IN

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### DISTRICT OF QUEBEC-E. BELAND, INSPECTOR.

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	Remarks, and Opinion of the Chief Analyst.				Sold as admix- ture.						Sold as admix- ture.		
RESULTS OF ANALYSIS.	Microscopical Examination.		Mustard & wheat starch	Mustard, wheat starch	« turmeric	:			Mustard, wheat starch & turmeric.	=	Mustard&wheatstarch Sold as admix- ture.	Mustard, wheat starch	& turmeric.
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## DISTRICT OF KINGSTON-JAS, HOGAN, INSPECTOR.

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# DISTRICT OF TORONTO-H. J. DAGER, INSPECTOR.

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### DISTRICT OF LONDON-T. KIDD, INSPECTOR.

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### BULLETIN No. 176-MUSTARD.

	Remarks and Opinion of the Chief Analyst.
ULTS OF ANALYSIS.	Microscopical Examination.
RESULTS OF	educing mat- ters by acid conversion calculated as starch,
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	Inspector's Repo
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### DISTRICT OF WINDSOR-J. TALBOT, INSPECTOR.

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# DISTRICT OF MANITOBA-A. C. LARIVIERE, INSPECTOR.

13.95 Mustard and wheat	4.25 None Mustard.	87.80 Mustard, wheat starch	0.44 Mustard and wheat	3.66 45.00 Mustard, maize starch and turnseric.
4.12	4.25 None.	3.50	18.8	3.66
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tard 35785 J. C. Callander & Co., Ph. 15 Keens Mustard, I.	35786 D. Sutherland, Hart. § 25 TheGoldStandardM	35787 Findlay Speer Co., ‡ 10 Campbell Bros, Wils. When I ake	35788 Geo. Manson & Sons, 1 15 Keens Mustard, L.	". 35789 C. McLearn, Winni 4 10 Genui, Eng. Peg. ard.
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# DISTRICT OF CALGARY-R. W. FLETCHER, INSPECTOR.

and turmeric.

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2.32 40.72 Mustard, wheat starch	and turmeric.		starch.	3.10 36.92 Mustard, wheat starch	" "
62.01	67.62	10.00	10 00	26.96	2.60 53.95
2.32	- 50	26.5	2 0	2.10	5.60
				***** *** *******	
nurn & Co	Wilson &	algary.	Witchell B	ito.	e& Grocery
10 L. T. Mewburn & Co	O Campbell, Wilson &	Horne, Calgary.  5 Keen, London, Eng.	O Todbunter Mitchell E.	Co., Toronto.	Co., London, Ont.
lb . 10 L. T. Mewburn & Co	10 Campbell, Wilson &	Horne, Calgary.	10 Todbunter Mitchell &	Co., Toronto.	In Canada Spice& Grocery
opas & Emerson, Cal.   1b. 10 L. T. Mewburn & Cogary.	J. Winn, Calgary. 4 10 Campbell, Wilson &	udsons Bay Co., Cal. J 15 Keen, London. Eng.	gary.  algary Milling Co., 3 10 Todhunter Mirchell E.	Calgary.	A. Molan, Calgary., t 15 Canada Spice& Grocery Co., London, Ont.
35356 Copas & Emerson, Cal. 1 lb. 10 L. T. Mewburn & Co. Rary.	35867 C. J. Winn, Calgary. 4 10 Campbell, Wilson &	Stars Hudsons Bay Co., Cal. 4 15 Keen, London. Eng.	33369 Calgary Milling Co., 3 ., 10 Todhuntar Mirchall E.	35370 I A Nolar Col.	Co., London, Calgary., t 15 Canada Spice& Grocery
:	33.67 C. J. Winn, Calgary. 4 10 Campbell, Wilson &	32368 Hudsons Bay Co., Cal. I 15 Keen, London, Eng.	33369 Calgary Milling Co., 4 10 Todhunter Mischall &	36370 I A Nolar Col	Co., London, Calgary., § " In Canada Spice& Grocery Co., London, Ont.
	3385 C. J. Winn, Calgary. J 10 Campbell, Wilson &	" 82868 Hudsons Bay Co., Cal. I 15 Keen, London. Fine.	" 33369 Calgary Milling Co., 1 " 10 Todhunter Mirebell E.	SESTA A Nolar Color	Co., London, Calgary., 1 15 Canada Spice & Grocery Co., London, Ont.
Jan. 18 Mustard 35356 Copas & Emerson, Cal. 1 lb . 10 L. T. Mewburn & Co-	Short C. J. Winn, Calgary. 4 10 Campbell, Wilson &	18 SNSS Hudsons Bay Co., Cal. 4 15 Keen, London. Eng.	18 " 33369 Calgary Milling Co., 1 " 10 Tochuntar Mirehou s.	18 " SS370.1 A Nolm Col. Toronto.	Co., London, Calgary., # " In Canada Spice & Grocery Co., London, Ont.

# DISTRICT OF VANCOUVER -J. F. POWER, INSPECTOR.

	2.78 40.5 Mustard, wheat starch	and curneric.	starch,	Mustard, wheat starch and turneric.	o 190 18 45 Mustard and wheat Sold as admix.	wheat starch.
	40.2			0) 24	18.40	200
	2.78	96.1	30.0	8 8	8	3
				:	:	
-	3	:	Van-			
Control of the Contro	Kelly Douglas & Vancouver.	:	Climax Mfg. Co	couver.	L.J. Coleman	
-	10	2	10	15	15	
A STATE OF THE PARTY OF THE PAR	Il A. Frederickson, Mo-4 lb., 10 Kelly Douglas & Co.,	2 W. Clark, Vancouver., 1 Tin., 15	B Direct Supply Co., Van. 3 1b. 10 Climax Mfg. Co., Van.	H. C. McQuarrie, Van. 1 Tin. 15 - Coleman	5 J. McArthur Van 1 15 J. J. Coleman	COUVET.
	375	3755	37553	37554	37556	
	Jan. 16 Mustard	=	:			
-	16.7	91	15	15	-	
	Jan.	=	=	=	2	

# DISTRICT OF VICTORIA-D. O'SULLIVAN, INSPECTOR.

an	06	In 90 Mines	-	- 6	817.	-				1				-	The statement		
i	3	21911		9	Ltd., Viet	rocery Co toria.	. * Tin	ଛି	5224 Windsor Grocery Co. 2 Tin. 29 Fallow & Co., Peter Labeled Fallow's 110 19:90 Mustard and wheat Sold as admix. borough, Eng. also labeled ad	"A.1" Mustard,	1.10	19.30	Mustard starch.	and	wheat	Sold as	admin
:	30	:	:	39275	Copas & Ye	sung, Viet	2	15	J. J. Coleman, Lon-	mixtu e.	4.00						
E	8	:	:	39276	Wm. B. Hal	l, Victoria,	3 Pkgs	8	4. Shilling & Co., San	an admixture.	5 3	is er	and cur	wheat neric.	starch	2	
:	52	*		39277	W. A. Jame	son Coffee	3 1b.	10	3927 W. A. Jameson Coffee 3 lb. 10 F. F. Dalley Hamil, Taken L.	mustard.	000	vone	Mustard		:		
ż	200	=	:	39278	Wm. B. Hall	ria. l, Victoria.	-61	8	Co., Victoria, ton, Ont. 19 Pioneer Coffee & Spice "Bull food Brand 3-on Sone. Mustard and turmeric."	in factory. "Bull Iboe" Brand	8 8	on-us	Mustard	ind tur	meric.		
									Mills, Victoria, i.C.	Pure English		3	and turn	wheat a	tarch		
										soldashigh grade mustard.							